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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

GIESY, ADAM

ART UNIT PAPER NUMBER

2651

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/601,409

Applicant(s)

JOHNS ET AL.

Examiner

Adam R. Giesy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 14, 15 and 17-24 is/are rejected.
- 7) ☒ Claim(s) 11-13, 16, and 25-27 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 7, 9, 14, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaku et al. (Kaku US Pat. No. 5,270,987) in view of Shi, Thornton, and Hesselink (referred to hereafter as Shi-1).

Regarding claim 1, Kaku discloses a device (Figure 1) comprising: a main magnetic pole (Figure 3C, element 302); and an aperture structure (read on by optical head - Figure 1, element 11) disposed adjacent the main magnetic pole, wherein light incident upon the aperture structure and a magnetic flux flowing through the main magnetic pole are co-locatable on a recording medium disposed adjacent the device (see column 7, lines 52-62). Kaku does not disclose that the aperture structure is a C-aperture.

Shi-1 discloses a C-aperture design (see abstract, page 320 - states that the C-aperture is for data storage systems and that power throughput is greater than a normal aperture).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the C-aperture disclosed by Shi for the aperture in the device disclosed by Kaku, the motivation being to conserve energy on the incident light used for recording.

Claim 14 contains similar limitations to claim 1 and is therefore rejected for the same reasons as discussed in the claim 1 rejection above.

Regarding claim 7, Kaku discloses all the limitations of claim 1 as described in the claim 1 rejection above, and further that the main magnetic pole includes a pole tip at an air bearing surface of the device, and wherein the aperture structure (optical head – Figure 1, element 11) is provided at the pole tip of the main magnetic pole (column 7, lines 52-62).

Claim 21 contains similar limitations to claim 7 and is therefore rejected for the same reasons as discussed in the claim 7 rejection above.

Regarding claim 9, Kaku discloses all the limitations of claim 1 as described in the claim 1 rejection above, and further comprising a focusing element (Figure 1, element 5) receiving light from a light source (2) and focusing the received light onto the aperture structure (column 7, lines 4-10).

Claim 23 contains similar limitations to claim 9 and is therefore rejected for the same reasons as discussed in the claim 9 rejection above.

3. Claims 2-6, 8, 10, 15, 17-20, 22, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kaku et al. (Kaku US Pat. No. 5,270,987) in view of Shi, Thornton, and Hesselink (referred to hereafter as Shi-1) and further in view of Kino et al. (Kino US Pat. No. 5,859,814).

Regarding claim 2, Kaku and Shi-1 disclose all the limitations of claim 1 as described in the claim 1 rejection above. Both references fail to disclose the composition of the aperture.

Kino discloses an optical aperture (read on by read/write head assembly – Figure 1, element 24) that composes a layer of dielectric material (see column 2, lines 4-11), the layer of dielectric material having a first index of refraction (column 1, lines 61-64); and a layer of conductive material disposed adjacent the layer of dielectric material (read on by the example

“aluminum” - column 6, line 11). The recording structure with the aperture disclosed by Kaku is combined with the C-aperture structure as disclosed by Shi-1 and the optical aperture (read/write head) of Kino to yield a magneto-optical recording apparatus that utilizes a C-aperture.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the C-aperture disclosed by Shi for the aperture in the device disclosed by Kino and insert it into the recording device as disclosed by Kaku, the motivation being to conserve energy on the incident light used for recording and create a more effective recording method that will improve track density.

Claim 17 contains similar limitations to claim 2 and is therefore rejected for the same reasons as discussed in the claim 2 rejection above.

Regarding claim 3, Kaku, Kino, and Shi-1 disclose all the limitations of claim 2 as described in the claim 2 rejection above, and further that the layer of dielectric material is selected from the group consisting of titanium oxide, tantalum oxide, aluminum oxide, silicon oxide, silicon nitride, and zinc sulfide (see Kino - column 2, lines 4-11). Kino discloses the use of silicon nitride.

Claim 18 contains similar limitations to claim 3 and is therefore rejected for the same reasons as discussed in the claim 3 rejection above.

Regarding claim 4, Kaku, Kino, and Shi-1 disclose all the limitations of claim 2 as described in the claim 2 rejection above, and further that the layer of conductive material is selected from the group consisting of gold, silver, copper and aluminum (see Kino - column 6, line 11).

Claim 19 contains similar limitations to claim 4 and is therefore rejected for the same reasons as discussed in the claim 4 rejection above.

Regarding claim 5, Kaku and Shi-1 disclose all the limitations of claim 2 as described in the claim 2 rejection above. Kaku discloses a slider (reads on main magnetic pole – Figure 3A, 3C with a magnetic pole element 302). This element inherently includes a front, back, leading edge, and trailing edge surfaces as seen but not labeled in Figure 3C (element 302). Both references fail to disclose the further limitation that the layers of dielectric material and conductive material are provided at the front, back and trailing edge surfaces of the main magnetic pole.

Kino suggests the use of the dielectric materials in his magneto-optical recording head (column 2, lines 4-11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the slider element disclosed by Kaku and the dielectric material and conductive material of the aperture as disclosed by Kino in order to obtain a magnetic recording head with a main magnetic pole containing a front, back, leading edge, and trailing edge surfaces and layers of dielectric material and conductive material provided at the front, back and trailing edge surfaces of the main magnetic pole, the motivation being to be able to more directly focus the light that is being delivered to the magnetic recording medium via the dielectric layer.

Claim 20 contains similar limitations to claim 5 and is therefore rejected for the same reasons as discussed in the claim 5 rejection above.

Regarding claim 6, Kaku and Shi-1 disclose all the limitations of claim 1 as described in the claim 1 rejection above. Kaku discloses a slider (reads on main magnetic pole – Figure 3A,

3C with a magnetic pole element 302). This element inherently includes a front, back, leading edge, and trailing edge surfaces as seen but not labeled in Figure 3C (element 302). Both references fail to disclose the further limitation the C-aperture structure is provided about the front, back and trailing edge surfaces of the main magnetic pole. Shi-1 discloses the C-aperture as stated in the claim 1 rejection above.

Kino suggests the use of the dielectric materials in his magneto-optical recording head (column 2, lines 4-11).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the slider element disclosed by Kaku, the C-aperture as disclosed by Shi-1, and the dielectric material and conductive material of the aperture as disclosed by Kino in order to obtain a magnetic recording head with a main magnetic pole containing a front, back, leading edge, and trailing edge surfaces and a C-aperture structure that is provided about the front, back and trailing edge surfaces of the main magnetic pole, the motivation being to be able to more directly focus the light that is being delivered to the magnetic recording medium via the dielectric layer, while using the C-aperture to increase the power of the light.

Claim 15 contains similar limitations to claim 6 and is therefore rejected for the same reasons as discussed in the claim 6 rejection above.

Regarding claim 8, Kaku and Shi-1 disclose all the limitations of claim 1 as described in the claim 1 rejection above. Both references fail to disclose the further limitation that the aperture structure includes a transducer with an air bearing surface.

Kino discloses a transducer (see "phototransducers" - column 4, lines 42-43) device deposited at an air bearing surface of the device (column 4, lines 11-15), the transducer device

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confining the light propagating through the aperture structure (column 4, lines 45-67 – especially lines 65-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the C-aperture and optic head device as disclosed by the combination of Kaku and Shi-1 above, with the magnetic head device as disclosed by Kino, the motivation being to obtain a device that can more efficiently heat magnetically recorded media and record data more effectively.

Claim 22 contains similar limitations to claim 8 and is therefore rejected for the same reasons as discussed in the claim 8 rejection above.

Regarding claim 10, Kaku and Shi-1 disclose all the limitations of claim 1 as described in the claim 1 rejection above. Both references fail to disclose that the focusing element is a planar waveguide.

Kino discloses the focusing element comprises a planar waveguide (column 4, lines 16-32).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the C-aperture and optic head device as disclosed by the combination of Kaku and Shi-1 above, with the planar waveguide as disclosed by Kino, the motivation being to obtain a device that more effectively relocates the light beam to a specific location for more accurate recording capabilities.

Claim 24 contains similar limitations to claim 10 and is therefore rejected for the same reasons as discussed in the claim 10 rejection above.

Allowable Subject Matter

4. Claims 11-13, 16, and 25-27 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 11 is allowable over prior art of record which does not disclose or suggest all of the limitations of claims 1, 9, and 10, as well as the further limitation **that the planar waveguide comprises: a layer of core material having a second index of refraction, the core layer planarized to a height of the C-aperture structure; and cladding layers disposed on opposite sides of the core layer, wherein the cladding layers have a third index of refraction less than the second index of refraction.**

Claims 12 and 13 are allowable for the reasons mentioned in the claim 11 objection above, as both claims 12 and 13 are dependent upon claim 11.

Claim 16 is allowable over prior art of record which does not disclose or suggest all of the limitations of claims 14 and 15 as well as the further limitation **that the C-aperture structure includes opposing arm members connected at an end by a waist member, and wherein the C-aperture structure is provided about the magnetic pole such that the opposing arm members are positioned adjacent the front and back edges of the magnetic pole and the waist member is positioned adjacent the trailing edge of the magnetic pole.**

Claim 25 is allowable over prior art of record which does not disclose or suggest all of the limitations of claims 14, 23, and 24, as well as the further limitation **that the planar waveguide comprises: a layer of core material having a second index of refraction, the core layer planarized to a height of the C-aperture structure; and cladding layers disposed on**

opposite sides of the core layer, wherein the cladding layers have a third index of refraction less than the second index of refraction.

Claims 26 and 27 are allowable for the reasons mentioned in the claim 25 objection above, as both claims 26 and 27 are dependent upon claim 25.

Conclusion

5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

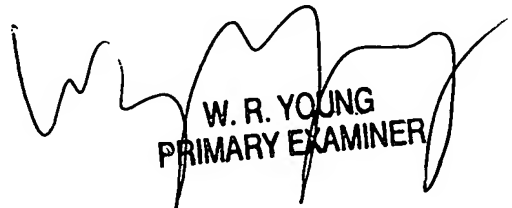
- a. Janson et al. (US at. No. 5,022,017) discloses magneto-optical recording.
- b. Watson (US Pat. No. 5,070,487) discloses magneto-optical recording and using an aperture to control the amount of light used to heat the medium.
- c. Bell (US Pat. No. 5,199,090) discloses use of a waveguide in a magneto-optical recording device.
- d. Shi and Hesselink (Mechanisms for Enhancing... - see attached for citation) disclose the C-aperture and its uses.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Adam R. Giesy whose telephone number is (703) 306-4080. The examiner can normally be reached on 8:00am- 4:15pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on (730) 305-4040. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ARG 12/16/2004


W. R. YOUNG
PRIMARY EXAMINER